

Portable Tools Using Abrasive Wheels

WAC 296-807-180

Summary

YOUR RESPONSIBILITY:

Make sure abrasive wheel tools and wheels are safe to use

Important:

This section applies to portable tools using abrasive wheels.



Definition:

Abrasive wheel

A grinding tool consisting of bonded abrasive grains. This includes diamond and reinforced wheels.



Exemption:

This section doesn't apply to machines using:

- Natural sandstone wheels
- Pulpstone wheels
- Coated abrasive products
- Loose abrasives.

You must

DESIGN AND CONSTRUCTION

Make sure abrasive wheels and tools are properly designed and constructed

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Portable Abrasive
Wheels and Tools



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Rule

DESIGN AND CONSTRUCTION

WAC 296-807-18005

Make sure abrasive wheels and tools are properly designed and constructed

You must

- Make sure abrasive wheels and tools meet the design and construction requirements of:
 - American National Standards Institute (ANSI) B7.1-2000, Safety Requirements for the Use, Care and Protection of Abrasive Wheels

OR

- ANSI B186.1-1984, Safety Code for Portable Air Tools.



Note:

Tools may have a statement on the tool or in the instruction manual that the tool meets the appropriate ANSI standard. If in doubt, check with the manufacturer.



Helpful Tool:

Abrasive wheel illustrations

You can find illustrations of specific types of wheels, general types of flanges, and mounting requirements, in the Resources section of this chapter.

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Rule

GUARDS

WAC 296-807-18010

Make sure machines have safety guards

You must

- Use abrasive wheels only on machines that have safety guards.
- Make sure the safety guard:
 - Is mounted so it maintains proper alignment with the wheel
 - Is mounted with fasteners strong enough to keep the guard in position if a wheel breaks
 - Is positioned to deflect pieces of an accidentally broken wheel away from the operator
 - Covers the spindle end, nut, and flange projections.



Exemption:

Safety guards aren't required on machines that use:

- Wheels for internal grinding while advancing, retracting or within the work
- Mounted wheels 2 inches or less in diameter
- Types 16, 17, 18, 18R, and 19 cones and plugs and threaded hole pot balls where:
 - The work offers protection
- or
- The size doesn't exceed 3 inches in diameter by 5 inches long.
- Notched, segmented, or continuous rim metal centered diamond lapidary wheels that are:
 - Used with a coolant deflector
- and
- Operated at 3,500 SFPM or less.

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Rule

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Exemption:

- Type 1 wheels that are:
 - 2 inches or less in diameter
 - 1/2 inch or less thick
 - Operating at peripheral speeds less than 1,800 SFPM
 - Mounted on mandrels and used in portable drills.
- Type 1 reinforced wheels that are:
 - 3 inches or less in diameter 1/4 inch or less thick
 - Operating at peripheral speeds of 9,500 SFPM or less
 - Used by operators wearing safety glasses and face shields.
- Valve seating grinding wheels.

WAC 296-807-18015

Keep safety guards in good functional condition

You must

- Make sure safety guards are in good functional condition.
 - Replace any safety guard that:
 - Is damaged, bent or severely worn
- OR**
- Has been hit by parts from a breaking wheel.



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Rule

GUARDS - SPECIFIC WHEELS

WAC 296-807-18020

Use specific safety guards for machines using Type 1 grinding wheels, cutting-off wheels, and tuck pointing wheels

You must

- Make sure the safety guard covers the top and sides of the wheel for at least 180°.



Note:

It isn't required to cover the spindle end, nut and outer flange.

WAC 296-807-18025

Use specific safety guards for vertical and angle grinders using Type 6 or Type 11 wheels

You must

- Make sure the safety guard:
 - Covers the wheel's plane of rotation toward the operator for at least 180°
 - Covers the side of the wheel toward the driving flange for at least 180°
 - Has a skirt which is adjustable to within 1/8 inch of the plane of the surface of the wheel.
- Make sure not to use a "revolving cup guard."



Note:

"Cup back bushings" don't substitute for safety guards.



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Rule

WAC 296-807-18030

Use specific safety guards for vertical and angle grinders using Type 27, 28 and 29 wheels

You must

- Make sure safety guards:
 - Cover the wheel's plane of rotation toward the operator for at least 180°
 - Cover the side of the wheel toward the driving flange for at least 180°
 - Have a lip on the outer edge that:
 - Extends beyond the surface of the wheel throughout the 180° coverage
- AND**
- Curls inward to deflect wheel fragments.

SIDE RAILS

WAC 296-807-18035

Use side handles on vertical and angle grinders

You must

- Use a side handle on all 4-inch and larger vertical and angle grinders.



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Rule

ABRASIVE WHEELS

WAC 296-807-18040

Make sure abrasive wheels are safe to use

You must

- Do the following before mounting a wheel:
 - Visually inspect the wheel for cracks or damage
 - Perform a ring test for cracks (size and shape of the wheel permitting)
 - Make sure the spindle speed of the machine isn't greater than the operating speed of the wheel.

You must

- Make sure a damaged or cracked wheel isn't mounted or used.



Helpful Tool:

Ring Test

You can find illustrations on how to do a ring test in the Resources section of this chapter.



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Rule MOUNTING

WAC 296-807-18045

Mount wheels properly

You must

- (1) Make sure wheels fit freely on the spindle, wheel sleeves, or adaptors, and remain free under all grinding conditions.
- (2) Make sure wheel, blotter and flange surfaces that contact each other are flat and free of foreign particles.
- (3) Make sure any reducing bushing used in the wheel hole:
 - Fits freely on the spindle and maintains proper clearance
 - Doesn't exceed the width of the wheel or contact the flanges.
- (4) Make sure that multiple wheels mounted between a single set of flanges are either:
 - Cemented together
 - OR**
 - Separated by spacers that have a diameter and bearing surface that is the same as the mounting flanges.



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Rule

FLANGES

WAC 296-807-18050

Use proper flanges

You must

- Mount all abrasive wheels between flanges that have a diameter at least 1/3 the diameter of the wheel.



Exemption:

- Mounted wheels
- Cup, cone or plug wheels with threaded inserts or projecting studs
- Abrasive disc wheels (inserted nut, inserted washer and projecting stud type)
- Plate mounted wheels
- Cylinder, cup, or segmental wheels mounted in chucks
- Types 27, 28 and 29 wheels
- Internal wheels less than 2 inches in diameter
- Modified Type 6 and 11 wheels (terrazzo)
- Types 1 and 27A cutting-off wheels.

You must

- Make sure flanges are:
 - Dimensionally accurate
 - Properly balanced
 - Flat
 - Free of rough surfaces or sharp edges.

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Rule

WAC 296-807-18050 (Continued)

You must

- Make sure, if a wheel is mounted between 2 flanges, that both flanges:
 - Are the same diameter
 - Have equal bearing surfaces.



Exemption:

The following wheels don't require same diameter, equal bearing surface flanges:

- Types 27, 28, and 29 wheels with adaptors
- Modified Types 6 and 11 wheels with tapered K dimension
- Internal wheels less than 2 inches in diameter.

You must

- Make sure the driving flange is:
 - Part of the spindle
- OR**
- Securely fastened to the spindle.

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WAC 296-807-180

Rule

WAC 296-807-18055

Make sure flanges are in good condition

You must

- Make sure flange bearing surfaces are in good condition.
- Replace or remachine any flange with a mounting surface that has any of the following problems:
 - Warped
 - Burred on the bearing surface
 - Excessively worn (thickness or diameter)
 - Out of true.



Note:

Flanges that are refaced or trued need to satisfy minimum dimension requirements specified in ANSI B7.1-2000, Safety Requirements for the Use, Care and Protection of Abrasive Wheels.



Portable Tools Using Abrasive Wheels

WAC 296-807-180

Rule

FLANGES - SPECIFIC WHEELS

WAC 296-807-18060

Use specific flanges for Type 1 cutting-off wheels

You must

- Mount Type 1 cutting-off wheels between flanges that are:
 - Properly relieved with matching bearing surfaces
 - At least 1/4 the wheel diameter.



Note:

American National Standards Institute (ANSI) B7.1-2000, Safety Requirements for the Use, Care and Protection of Abrasive Wheels, has specific exemptions for some reinforced, bonded abrasive cutting-off wheels and steel centered, diamond cutting-off wheels. These wheels are primarily used for masonry cutting and concrete sawing.

WAC 296-807-18065

Use specific flanges for Type 27A cutting-off wheels

You must

- Mount Type 27A cutting-off wheels between flanges that are:
 - Flat (unrelieved) with matching bearing surfaces
 - At least 1/4 the wheel diameter.

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WAC 296-807-180

Rule

WAC 296-807-18070

Use specific flanges for threaded hole wheels

You must

- Use a back flange to mount threaded hole wheels that is:
 - Flat (unrelieved)
 - Securely fastened and square to the spindle axis
 - Able to properly support the wheel.

WAC 296-807-18075

Use specific flanges for cup, cone or plug wheels with threaded inserts or projecting studs

You must

- Mount cup, cone or plug wheels with threaded inserts or projecting studs against a straight, unrelieved flange.



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Rule

BLOTTERS

WAC 296-807-18080

Use blotters when required

You must

- Use a blotter between each flange and the abrasive wheel surface to uniformly distribute flange pressure.
- Make sure the blotter covers the entire flange contact area.
- Use a new blotter each time a wheel is mounted unless the wheel has a blotter already attached to it by the manufacturer.
- Make sure scuffed or damaged blotters aren't used.



Exemption:

You don't need to use a blotter with:

- Mounted wheels
- Abrasive disc and Type 2 wheels which are mounted by inserted nuts, inserted washers, or projecting studs
- Plate mounted wheels
- Wheels mounted in chucks (such as cylinders and segmental wheels)
- Types 27, 28 and 29 wheels
- Type 1 and Type 27A cutting-off wheels
- Internal wheels less than 2 inches in diameter
- Diamond and cubic boron nitride wheels with metal or carbon fiber cores.

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Rule

BLOTTERS - TYPE 6 AND 11 WHEELS

WAC 296-807-18085

Meet specific blotter requirements when using modified Types 6 and 11 wheels (terrazzo)

You must

- Mount modified Types 6 and 11 wheels (terrazzo) with a blotter applied to the flat side of the wheel only.

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Notes
